REMARKS

Applicant respectfully requests that the Examiner reconsider the above-identified patent application in light of the Amendment and following Remarks.

Priority

The Examiner contends that Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C.§120. More specifically, the Examiner contends that the disclosure of the prior-filed application, Application No. 10/261,863 ("'863 application"), fails to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. § 112 for one or more claims of this application on the ground that the parent application does not make any mention of any type of "lithium fluoride" compounds.

35 U.S.C. § 120 contains four requirements for a continuing application: continuity of prosecution; a later application must make reference to the earlier application; continuity of inventorship; and continuity of disclosure.

The present invention is a continuation-in-part of the earlier application, that is, it was filed during the lifetime of the earlier nonprovisional application and includes matter not disclosed in the earlier nonprovisional application. MPEP 201.08.

The present invention has continuity of prosecution, since at the time the present invention was filed on November 25, 2003, U.S. Application No. 10/261,863 (filed Oct. 1, 2002) and provisional application No. 60/429,492 (filed Nov. 27, 2002) were pending.

The present application properly refers to both earlier applications. It claims the benefit of both U.S. Application 10/261,863 (filed Oct. 2002), and U.S. Provisional Application No. 60/429,492 (filed Nov. 27, 2002).

The present invention has continuity of inventorship: Dr. Amatucci is an inventor of both the present and the prior application.

Applicant urges that the present invention has continuity of disclosure because the subject matter of the present invention is adequately disclosed in the earlier application as required by 35 U.S.C. §112 para. 1. 35 U.S.C. §112 para. 1 requires that the specification contain a written description of the invention which "convey[s] with reasonable clarity to those skilled in the art that, as of the filing date sought," the inventor was in possession of the invention. *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, 19 U.S.P.Q.2d 1111 (Fed. Cir. 1991). Applicants is permitted to use any style of expression which makes the boundaries of the subject matter for which patent protection is sought clear. MPEP 2173.01. 35 U.S.C. §112 para. 1 also requires that a hypothetical person of ordinary skill in the art, reading the specification of the application as filed, be able to make and use the claimed invention without undue experimentation. MPEP 2164.05.

Applicant respectfully urges that the subject matter of the claims of the present invention is supported by the prior application. Section 5.2.1.3 of the specification of the present application, which begins on page 13, teaches that that the lithium fluoride compound nanocomposites of the present invention can be made by taking an electrode containing a carbon metal fluoride nanocomposite, such as FeF_3 and 15 wt% carbon, and placing it in direct contact with a reducing agent such as Li metal. The reaction is represented in lines 17-18 of the present application. The '863 application discloses how to make and use the carbon metal fluoride nanoamalgam, which is the starting material for the present invention. The '863 application discloses that a nanoamalgam of a

transition metal fluoride and carbon may be prepared by subjecting a mixture of a transition metal fluoride, such as FeF_3, and carbon to extreme high energy impact comminution milling, which results in the conversion of the mixture to a nanostructure material ['863 Application, Abstract, para. [0007], para. [0009]]. It further discloses that the transition metal fluoride: carbon nanoamalgams may be employed as the electroactive material of positive cell electrodes, and that the negative electrode members of such cells may comprise any of the widely used lithium ion source materials, including as lithium metal. ('863 Application, para. [0008]).

The present application further discloses that metal fluoride compounds useful in the present invention include, but are not limited to, nontransition metals and transition metals, preferably transition metals, more preferably, first row transition metals. (Spec., p. 7, lines 18-21). It further discloses that specific examples of metals for use in metal fluorides of the present invention include Fe, Co, Ni, Mn, Cu, V, Mo, Pb, Sb, Bi or Si or their substituted derivatives. (Spec. p. 7, lines 21-25). The present application also discloses that compounds such as FeF_2, FeF_3, CoF_2, NiF_2, and $(NH_4)_xMe_YF_z$, where Me is a transition metal, $1 \leq x \leq 4$, $1 \leq y \leq 2$, and $4 \leq z \leq 6$, may be employed. (Spec., page 7, lines 24-26). Moreover, it discloses that the carbon component derives from commercial electrochemical cell grade carbons, such as acid-treated expanded graphite, activated carbon, and grapheme chain conductive carbon black. (Spec. p. 7, lines 28-30). The '863 application discloses that transition metal fluoride compounds that have exhibited significant utility in that invention include those of first row transition metals, such as Fe, Co, and Ni, and substituted derivatives thereof. It further discloses that compounds such as FeF_2, FeF_3, CoF_2, NiF_2, and $(NH_4)_xMe_YF_z$, where Me is a transition

metal, $1 \leq x \leq 4$, $1 \leq y \leq 2$, and $4 \leq z \leq 6$, may be employed in the formation of the active nanoamalgam when processed with most commercial electrochemical cell grade carbons, such as acid-treated expanded graphite, activated carbon, and graphene chain conductive carbon black. ('863 application, para. [0009].

The present invention describes Examples 1-9 as examples of carbon metal fluoride composites. Examples 1-9 of the '863 application, which are identical to Examples 1-9 of the present application, are described as examples of transition metal fluoride: carbon nanoamalgams.

Applicant urges that the specification contain a written description of the invention which "convey[s] with reasonable clarity to those skilled in the art that, as of the filing date sought," the inventor was in possession of the invention, *and* a hypothetical person of ordinary skill in the art, reading the specification of the application as filed, would be able to make and use the claimed invention without undue experimentation. Since Applicant has properly claimed the benefit of priority to both a prior non-provisional application under 35 U.S.C.§ 120 and a provisional application under 35 U.S.C. §119(e), and since the earlier '863 application provides adequate written description and enablement support of the present invention so as to fulfill the written description and enablement requirements of 35 U.S.C. §112 para. 1, Applicant respectfully requests that the Examiner withdraw this objection.

Election/Restriction

Claims 1-64 are pending in the application. Of these claims, claims 31-64 were withdrawn from consideration as being drawn to a non-elected invention following a telephone conversation with Applicant's representative. The Examiner has requested that

in replying to this Office action, Applicant affirm this election. Applicant hereby affirms election of claims 1-30. As a result, claims 1-30 are pending; claims 31-64 having been withdrawn as directed to nonelected subject matter.

Applicant has amended claims 1 and 28 to clarify that the voltage recited in claim 1 is relative to a Li/Li^+ reference potential. Support for this amendment may be found, for example, on page 14, section 5.2.2, lines 5-16 of the present application, which discloses that the electrodes for use with the lithium fluoride compound nanocomposites of the present invention can be tested electrochemically versus Li metal.

Applicant acknowledges and thanks the Examiner for allowing claims 11, 17, 20 and 22-30 on the ground that the prior art does not teach or suggest a composition containing nanoscale lithium fluoride and carbon.

35 U.S.C. 102

(1) The Examiner has rejected claims 1, 5-7, 12-14, 16, 18, 19 and 21 under 35 U.S.C. § 102(b) as anticipated by Roth et al., "Nanocrystalline LiF via microemulsion systems," *J. Materials Chemistry* 9: 493-97 (1999). The Examiner contends that the prior art inherently meets the claimed specific capacity limitations of claim 1.

A single prior art reference or a single prior art product, process or device that discloses or embodies, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation. *See In re Paulsen*, 30 F.3d 1475, 1478 (Fed. Cir. 1994); *Minnesota Min. & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 1565 (Fed. Cir. 1992). Therefore a prior art reference without express reference to a claim limitation may nonetheless anticipate by inherency. *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349 (Fed. Cir. 2002). In general, a limitation or the entire

invention is inherent if it is the 'natural result flowing from' what is explicitly disclosed in the reference. *See, e.g., Schering Corp. v. Geneva Pharmaceuticals, Inc.*, 339 F.3d 1373, 1379 (Fed. Cir. 2003). Inherency does not require that a person of ordinary skill in the art at the time would have recognized the inherent disclosure. *Id.*

An anticipatory reference also must enable a skilled artisan to make and use the claimed invention. *See Bristol-Myers Squibb Co. v. Ben Venue Laboratories, Inc.*, 246 F.3d 1368, 1374, 58 U.S.P.Q.2d 1508 (Fed. Cir. 2001)(*citing In re Donohue*, 766 F.2d 531, 533, 226 U.S.P.Q. 619, 621 (Fed. Cir. 1985)).

A rejection based on 35 U.S.C. §102(e) can be overcome by persuasively arguing that the claims are patentably distinguishable from the prior art, and by amending the claims to patentably distinguish over the prior art. MPEP 706.02(b).

Applicant urges that the pending claims are patentably distinguishable from the prior art because Roth does not teach or suggest every limitation in every claim. Roth merely discloses a chemical method to prepare nanocrystalline LiF from solutions of LiOAc and NH_4F. Roth states that the nanocrystalline LiF made is useful as an ideal system for investigations of, e.g., the optical properties of nanostructured materials (p. 493, bottom left). However, nothing in Roth either teaches or suggests how to use nanocrystalline LiF to form electrodes, no less rechargeable electrochemical energy storage systems, which are the subject of the present invention.

Applicant further urges that the missing claim elements are not necessarily present in Roth, are not the 'natural result flowing from' what is explicitly disclosed in Roth, and would not be so recognized by persons of ordinary skill. More specifically, Roth does not demonstrate a LiF composition useful in an electrochemical cell that would

result in the formation of a composition that would demonstrate a specific capacity of 100 mAh/g to 700 mAh/g at a voltage of about 2 volts to about 5 volts relative to a Li/Li+ reference potential, which is the basis of independent claim 1. Likewise, Roth does not anticipate claims 5-7 and 12-14, which depend from claim 1.

Applicant has canceled claims 18, 19 and 20 and amended claim 16 to incorporate the limitation of claim 20 . The Examiner allowed original claim 20 on the ground that the claimed 2 nm to 15 nm particles are not found in the prior art. As amended, claim 16 recites "A composition comprising particles of about 2 nm to about 15 nm, wherein the particles comprise a lithium fluoride compound." Therefore, Roth does not anticipate claim 16 as amended or claims 17 and 21-30, which depend from claim 16.

Applicant therefore respectfully requests that the Examiner withdraw this ground for rejection.

(2) The Examiner rejected claims 8-10 under 35 U.S.C. §102(e) as anticipated by U.S. Pat. No. 6,756,155, issued to Kweon et al. ("Kweon"). The Examiner contends that Kweon teaches a "positive active material" for a rechargeable lithium battery, wherein the active materials contain a compound comprised of formula (1), i.e., $LiCoA_2$, wherein A can be fluorine (citing Col. 3, lines 11-24).

Notwithstanding that the range of pure $LiCoF_2$ in the composition reported in the reference is a composition that is not possible to fabricate in nature, applicant has amended claims 8 and 10 to remove reference to Co. Applicant therefore respectfully requests that the Examiner withdraw this ground for rejection.

35 U.S.C. 103

The Examiner rejected claims 1-7 under 35 U.S.C.§ 103(a) as being unpatentable over U.S. Pat. No. 6,645,452 to Barker ("Barker"). The Examiner contends that Barker teaches methods of making lithium metal cathode active materials via reaction of a lithium compound with a metal oxide and a reducing agent, e.g., carbon, which is reacted in excess with unreacted carbon being incorporated with the active material of the electrode (Col. 6, lines 29-34). Other reducing agents, that can be used include a variety of different metals such as iron, cobalt, nickel and manganese (Col. 8, lines 42-50).

The Examiner also rejected claims 15 and 20 under 35 U.S.C. §103(a) as being unpatentable over Roth. The Examiner admits that Roth does not teach nanocrystals with particle size ranges of 2 to 15 nm as required by claims 15 and 20, but reasons that it would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the reaction time of Roth's emulsion process as suggested in Roth's abstract through routine experimentation.

U.S.C.§103 requires that the claimed invention as a whole should not have been obvious to a person having ordinary skill in the art at the time the invention was made A §103 rejection presumes that there are differences between the claimed subject matter and the prior art. The Examiner evaluates (1) the scope and content of the prior art, (2) the differences between the prior art and the claims at issue, (3) the level of ordinary skill in the pertinent art, and (4) objective evidence of nonobviousness including commercial success, long felt but unsolved needs, failure of others, recognition of a problem, failed attempts to solve a problem, teaching away by those skilled in the art, and results unexpected to those skilled in the art. *See Graham v. John Deere Co.*, 383 U.S. 1, 148

U.S.P.Q. 459 (1966); MPEP 2141; 716.01. "Often it will be necessary to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit" *KSR Int'l Co. v. Teleflex Inc. et al.*, 550 U.S. __, Bench Opinion at 14, April 30, 2007).

In *KSR*, the Court further recognized that a showing of "teaching, suggestion or motivation" to combine the prior art to meet the claimed subject matter could provide a helpful insight in determining whether the claimed subject matter is obvious. *Id.* A showing of "teaching, suggestion or motivation" requires that the prior art must teach or suggest every limitation in every claim (MPEP 2143.03), that there be a basis in the art for combining or modifying references (MPEP 2143.01), and that there be a reasonable degree of predictability of success in the proposed modification or combination (MPEP 2143.02). Moreover, for a reference to be a proper obviousness reference, it must contain (1) detailed enabling methodology for practicing the invention without undue experimentation; (2) a suggestion to modify the prior art to practice the claimed invention; and (3) evidence suggesting that the modification would be successful in achieving the invention. *In re O'Farrell*, 853 F.2d 894, 901, 7 U.S.P.Q.2d 1673, 1681 (Fed. Cir. 1988). *See also In re Nunberg*, 33 U.S.P.Q.2d 1953 (Fed. Cir. 1994); *In re Vaeck*, 947 F.2d 488, 493, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

The disclosure of the present invention teaches the synthesis of, and claims, compositions comprising lithium fluoride compounds. These lithium fluoride compounds are combined with a metal to be used as the electrode in a lithium battery.

As for Barker, Applicant urges that Barker does not teach or suggest a metal used in combination with lithium fluoride compounds as a composition, no less one that delivers capacity and voltage, as claimed in claims 1-7. Moreover, neither Barker's disclosure nor the state of knowledge in the art at the time the invention was made would have motivated a person of skill in the art to modify Barker in order to achieve the invention claimed in claims 1-7. Barker does not disclose, teach or suggest compositions containing lithium fluoride compounds. Instead, Barker teaches and discloses methods for producing electrode active lithium metal phosphate materials for use as active materials in electrodes. Barker's method teaches the combination of a metal with a phosphate and lithium source to form a lithiated metal phosphate at high temperatures. It is this material, the lithiated metal phosphate, which then is utilized in the electrochemical cell. While the equations in para. [0074] of the present invention teach and disclose that the lithium fluoride compounds of the present invention form conversion type electrodes, Barker teaches only intercalation type electrodes for lithium batteries. See, e.g., Col. 13-14. There is no reason a person of ordinary skill would modify Barker in the fashion as claimed by the present application, there is no basis in the art for modifying Barker to achieve the present invention, and there is no reasonable degree of predictability of success in any proposed modification of Barker.

As for Roth, Applicant urges that Roth does not teach or suggest a metal used in combination with lithium fluoride compounds as a composition, no less one that delivers

capacity and voltage, wherein the lithium fluoride compound comprises particles of about 2 nm to about 15 nm as claimed in claims 15 and amended claim 16, which as amended incorporates original claim 20. Neither Roth's disclosure nor the state of knowledge in the art at the time the invention was made would have motivated a person of skill in the art to modify Roth in order to achieve the inventions claimed in claims 15 and 16 as amended. As discussed above, Roth merely discloses a chemical method to prepare nanocrystalline LiF from an LiOAc solution and an NH_4F solution. Roth states that the nanocrystalline LiF made is useful as an ideal system for investigations of, e.g., the optical properties of nanostructured materials (p. 493, bottom left), but nothing in Roth either teaches or suggests how to use nanocrystalline LiF to form electrodes, no less rechargeable electrochemical energy storage systems, which are the subject of the present invention. There is no reason a person of ordinary skill would modify Roth in the fashion as claimed by the present application, there is no basis in the art for modifying Roth to achieve the present invention, and there is no reasonable degree of predictability of success in any proposed modification of Roth.

For these reasons, Applicant therefore respectfully requests that the Examiner withdraw the obviousness grounds for rejection over Barker and over Roth.

Since there is no prior art that teaches or suggests the claimed invention, Applicant respectfully requests that the Examiner withdraw all objections to and rejections of the present invention.

Applicant urges that this application is now in condition for allowance and earnestly solicits early and favorable action by the Examiner. If the Examiner believes that issues may be resolved by a telephone interview, the Examiner is respectfully urged

to telephone the undersigned at 212-883-4930. The undersigned also may be contacted via e-mail at blubit@wolfblock.com.3

AUTHORIZATION

The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account 23-2820.

Respectfully submitted,

For Wolf, Block, Schorr & Solis Cohen, LLP

By:

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